

What is claimed is:

1. A valve arrangement comprising:
 - (a) a one-piece piston-diaphragm member; the one-piece piston-diaphragm member including a connecting rod terminating at a piston head;
 - (i) the piston head defining oppositely disposed first and second pressure-receiving surfaces constructed and arranged to respond to pressure;
 - (ii) the piston head further defining a relief aperture arrangement extending between the oppositely disposed first and second pressure-receiving surfaces;
 - (iii) the one-piece piston-diaphragm member including an adapter with a diaphragm molded over the adapter;
 - (A) a diaphragm oriented to form a seal with a housing, when the valve arrangement is operably installed within a housing;
 - (b) a plate in movable covering relation to the relief aperture arrangement in the piston head; the plate forming a releasable seal arrangement with the relief aperture arrangement; and
 - (c) a first biasing member applying force against the plate to hold the plate in movable covering relation to the relief aperture arrangement.
 2. A valve arrangement according to claim 1 wherein:
 - (a) the plate is oriented against the first pressure-receiving surface of the piston head; and
 - (b) the first biasing member comprises a spring oriented between and against a portion of the connecting rod and the plate.
 3. A valve arrangement according to claim 2 further comprising:

- (a) a second biasing member applying force against the second pressure-receiving surface of the piston head.
- 4. A valve arrangement according to claim 1 wherein:
 - (a) the diaphragm includes:
 - (i) a rounded edge along an outer periphery constructed and arranged to fit in sealing engagement with a housing; and
 - (ii) a U-shaped flexible portion extending from the rounded edge to the piston head;
 - (A) the U-shaped flexible portion flexing in response to pressure forces on the piston head to permit the one-piece piston-diaphragm member to move in a direction parallel to the connecting rod.
- 5. A valve arrangement according to claim 2 wherein:
 - (a) the relief aperture arrangement comprises an inner ring and an outer ring of spaced holes in the piston head.
- 6. A valve arrangement according to claim 5 wherein:
 - (a) the plate is ring-shaped with a central aperture, a piston-head side and an opposite spring-receiving side;
 - (i) the connecting rod penetrating the central aperture;
 - (b) the relief aperture arrangement being exposed to the piston-head side of the plate;
 - (i) the plate being movable away from and out of sealing engagement with the relief aperture arrangement in response to pressure forces on the piston-head side of the plate through the relief aperture arrangement.
- 7. A valve arrangement according to claim 6 wherein:

- (a) the connecting rod includes an end surface with a radially extending flange.

8. A valve arrangement according to claim 7 wherein:

- (b) the spring-receiving side of the plate defines a spring seat having an axially projecting surface;
- (i) the spring being oriented between and against the radially extending flange and the spring seat.

9. A valve arrangement according to claim 3 wherein:

- (a) the piston head defines an axially extending member with a groove in a radial surface of the axially extending member;
- (i) the second biasing member including a portion held within the groove of the axially extending member.

10 A valve arrangement according to claim 1 wherein:

- (a) the adapter comprises glass filled nylon;
- (b) the plate comprises glass filled nylon; and
- (c) the diaphragm comprises rubber.

11. A closed crankcase system comprising:

- (a) an air filter;
- (b) an engine in gas flow communication with the air filter; the engine having a crankcase producing blow-by fluid;
- (c) a blow-by filtration system downstream of and in fluid communication with the engine crankcase;
- (i) the blow-by filtration system having a housing with a blow-by fluid inlet, a liquid outlet, a filtered gas port, and a blow-by filter member;
- (ii) the filtered gas port being in gas-flow communication with the engine; and

- (d) a valve arrangement operably installed in the blow-by filtration system housing downstream of the blow-by fluid inlet; the valve arrangement comprising:
 - (i) a one-piece piston-diaphragm member; the one-piece piston-diaphragm member including a connecting rod terminating at a piston head;
 - (A) the piston head defining oppositely disposed first and second pressure-receiving surfaces constructed and arranged to respond to pressure;
 - (B) the piston head further defining a relief aperture arrangement extending between the oppositely disposed first and second pressure-receiving surfaces;
 - (C) the one-piece piston-diaphragm member including an adapter with a diaphragm molded over the adapter;
 - (1) a diaphragm forming a seal with the housing;
 - (ii) a plate in movable covering relation to the relief aperture arrangement in the piston head; the plate forming a releasable seal arrangement with the relief aperture arrangement;
 - (iii) a first biasing member applying force against the plate to hold the plate in movable covering relation to the relief aperture arrangement; and
 - (iv) a second biasing member applying force against the second pressure-receiving surface of the piston head to control a flow of blow-by fluid from the blow-by fluid inlet to the blow-by filter member.

12. A closed crankcase system according to claim 11 wherein:

- (a) the blow-by filter member includes a first stage coalescer filter and a second stage gas filter.

13. A closed crankcase system according to claim 11 wherein:

- (a) the housing further includes a blow-by relief outlet channel;
- (b) the plate is ring-shaped with a central aperture, a piston-head side and an opposite spring-receiving side;
 - (i) the connecting rod penetrating the central aperture;
- (c) the relief aperture arrangement being exposed to the piston-head side of the plate;
 - (i) the plate being movable away from and out of sealing engagement with the relief aperture arrangement in response to pressure forces on the piston-head side of the plate through the relief aperture arrangement to permit the flow of blow-by fluid through the relief aperture arrangement and out of the housing through the blow-by relief outlet channel.

14. A closed crankcase system according to claim 13 wherein:

- (a) the diaphragm includes:
 - (i) a rounded edge along an outer periphery in sealing engagement with the housing; and
 - (ii) a U-shaped flexible portion extending from the rounded edge to the piston head;
 - (A) the U-shaped flexible portion flexing in response to pressure forces on the piston head to permit the piston to move in a direction parallel to the connecting rod.

15. A closed crankcase system according to claim 14 wherein:

- (a) the housing defines an inlet tube with a collar;
- (b) the piston head defines an axially extending member with a groove in a radial surface of the axially extending member;
 - (i) the second biasing member circumscribing the inlet tube; and
 - (ii) the second biasing member being oriented within the groove of the axially extending member and against the collar of the inlet tube.

16. A method for regulating pressure in a closed crankcase system; the method comprising:
 - (a) directing blow-by fluid from an engine crankcase to a valve arrangement; the valve arrangement comprising:
 - (i) a one-piece piston-diaphragm member; the one-piece piston-diaphragm member including a connecting rod terminating at a piston head;
 - (A) the piston head defining oppositely disposed first and second pressure-receiving surfaces constructed and arranged to respond to pressure caused by the blow-by fluid;
 - (B) the piston head further defining a relief aperture arrangement extending between the oppositely disposed first and second pressure-receiving surfaces;
 - (C) the one-piece piston-diaphragm member including an adapter with a diaphragm molded over the adapter;
 - (ii) a plate in movable covering relation to the relief aperture arrangement in the piston head; the plate forming a releasable seal arrangement with the relief aperture arrangement;
 - (b) controlling flow of blow-by fluid through the relief aperture arrangement by applying force against the plate to hold the plate in movable covering relation to the relief aperture arrangement; and
 - (c) controlling flow of the blow-by fluid to downstream components by applying force against the second pressure-receiving surface of the piston head.
 17. A method according to claim 16 wherein:
 - (a) the step of controlling flow of blow-by fluid through the relief aperture arrangement includes using a first spring oriented between the plate and a

portion of the connecting rod to bias the plate in covering relation to the relief aperture arrangement.

18. A method according to claim 17 wherein:
 - (a) the step of controlling flow of the blow-by fluid to downstream components includes using a second spring to apply force against the second pressure-receiving surface of the piston head to control a flow of blow-by fluid to downstream components.

19. A method according to claim 18 wherein:
 - (a) the step of using a second spring to apply force against the second pressure-receiving surface of the piston head to control a flow of blow-by fluid to downstream components includes controlling a flow of blow-by fluid to a first stage coalescer filter and a second stage gas filter.